

REQUEST FOR PROPOSALS  
MONTEREY BAY SANCTUARY FOUNDATION  
MONTEREY BAY AND GULF OF THE FARALLONES  
NATIONAL MARINE SANCTUARIES  
SANCTUARY INTEGRATED MONITORING NETWORK (SIMoN)

TO: Scientific Community and Interested Parties

SUBJECT: Request for proposals to survey and map California's northern central coast between Monterey and Bodega Bay, as part of the California Coastal and Marine Mapping Initiative of the California State Coastal Conservancy.

INTRODUCTION: There is a clear need for more comprehensive physical, geological, chemical, and biological mapping and characterization in order to effectively monitor ocean and coastal resources. Detailed maps of bathymetry and seafloor characteristics are essential for effectively managing habitats and resources (e.g., within marine protected areas), and are a basic foundation on which other data can be interpreted. These are critically important elements in designing successful management strategies.

The Monterey Bay Sanctuary Foundation, in collaboration with the National Marine Sanctuary Program, *Sanctuary Integrated Monitoring Network* (SIMoN), will fund a contract that will:

Implement data acquisition for nearshore and offshore substrate and marine habitat mapping along the northern central California coast. Data acquisition and mapping shall focus especially on areas within the northern central California coast for which there is currently limited or no data or mapping. Acquisition of mapping data may be accomplished using a variety of technologies, including but not limited to multibeam and sidescan sonar, acoustic backscatter, and LiDAR. Data acquired shall also be analyzed and interpreted as necessary to create substrate and habitat maps from the raw data, for use by resource management agencies and others.

The funding for this project has been provided by the State Coastal Conservancy and the California Ocean Protection Council, through a contract with the Monterey Bay Sanctuary Foundation. We welcome proposals from all sources, including academic and research institutions, private industry, nonprofit organizations, public entities, or any team comprised of any of these entities. Proposers are encouraged to prepare collaborative proposals, and include in-kind and matching contributions to augment the total budget. The data acquisition and mapping proposals should maximize the amount of new area mapped, including near shore areas, and provide for derivative mapping products.

NOAA has offered the use of their research vessels for up to thirty days per year in 2006 and 2007 (subject to availability) for mapping and/or ground-truthing activities. Vessel specifications and equipment are described online at:

<http://montereybay.noaa.gov/research/platforms.html>

Proposers are encouraged to contact Paul Householder to discuss NOAA shiptime requirements, [paul.householder@noaa.gov](mailto:paul.householder@noaa.gov).

Proposers should refer to the proceedings of the “Statewide Marine Mapping Planning Workshop” conducted December 12 - 13, 2005 at California State University, Monterey Bay, for additional information and recommendations related to mapping projects.

The workshop website, hosted by the CSUMB Seafloor Mapping Lab and the NOAA funded CSU CICORE Program, is:

<http://seafloor.csumb.edu/StrategicMappingWorkshop.htm>

There was consensus at that workshop that the minimum universal seafloor mapping information for California should cover all “lands” from the shore strand line (MHHW) out to the 3 nautical mile state water limit and include:

- Seabed geomorphology (relief via xyz digital elevation models - DEM)
- Texture (substrate type via backscatter mosaics)
- Ground-truthing (via video or physical samples)
- Meet or exceed IHO order 1 standards, and be carried out at the maximum resolution obtainable using state-of-the-industry tools
- Best available geodetic positioning technology (vertical and horizontal)

And where appropriate and possible;

- Subsurface structure, sediment thickness and stratigraphy via sub-bottom profiles & coring

The ideal proposal will include an appropriate weighting of data collection and interpretation to maximize field data while simultaneously producing certain thematic maps with high-priority resource management information. Exhibit 1 describes three tiers of interpretation and habitat classification products as discussed at the Statewide Marine Mapping Planning Workshop. For the purposes of this RFP, we require Tier 1 and 2 products. Tier 3 products, especially habitat classification maps, are desirable though not required.

Common seafloor mapping data needs and applications expressed in discussions at the Statewide Marine Mapping Planning Workshop included:

- Base maps for environmental change detection via repetitive mapping
- Mapping in support of the MLPA process
- Environmental monitoring
- Identification of biological hot spots (especially areas of high relief, submarine canyons and shelf break)
- Habitat maps for fisheries management & stock assessment

- Habitat maps of existing marine protected areas
- Sediment transport dynamics (erosion, deposition and beach nourishment)
- Geologic hazards (faults and landslides capable of producing tsunamis)
- Safe navigation in shallows, bays, harbors and estuaries
- Economical sources of sand
- Data to support wave, current and oil spill impact prediction models
- Location of ship wrecks with potential for oil leaks
- Location of derelict fishing gear

The need for baseline maps for monitoring and assessment were the most common requirements expressed among a very diverse list of mapping user needs.

Excerpts from the Statewide Marine Mapping Planning Workshop applicable to the RFP are included below. It is hoped that respondents to the RFP will capitalize on the existing mapping data and propose ways to fill the gaps in our knowledge to benefit the widest number of mapping user needs. An important element in this RFP is the desire to inform future MLPA implementation efforts. We recognize that there may need to be trade-offs within the confines of the budgeted amount of money (e.g. spatial coverage vs. resolution, data acquisition vs. tier 2 and tier 3 derivative products.)

The Data Holdings Coverage Map for the RFP Project Area was updated as part of the December workshop referenced above, and is shown in Figure 1. Additional guidance on the priorities expressed at the workshop is also provided below.

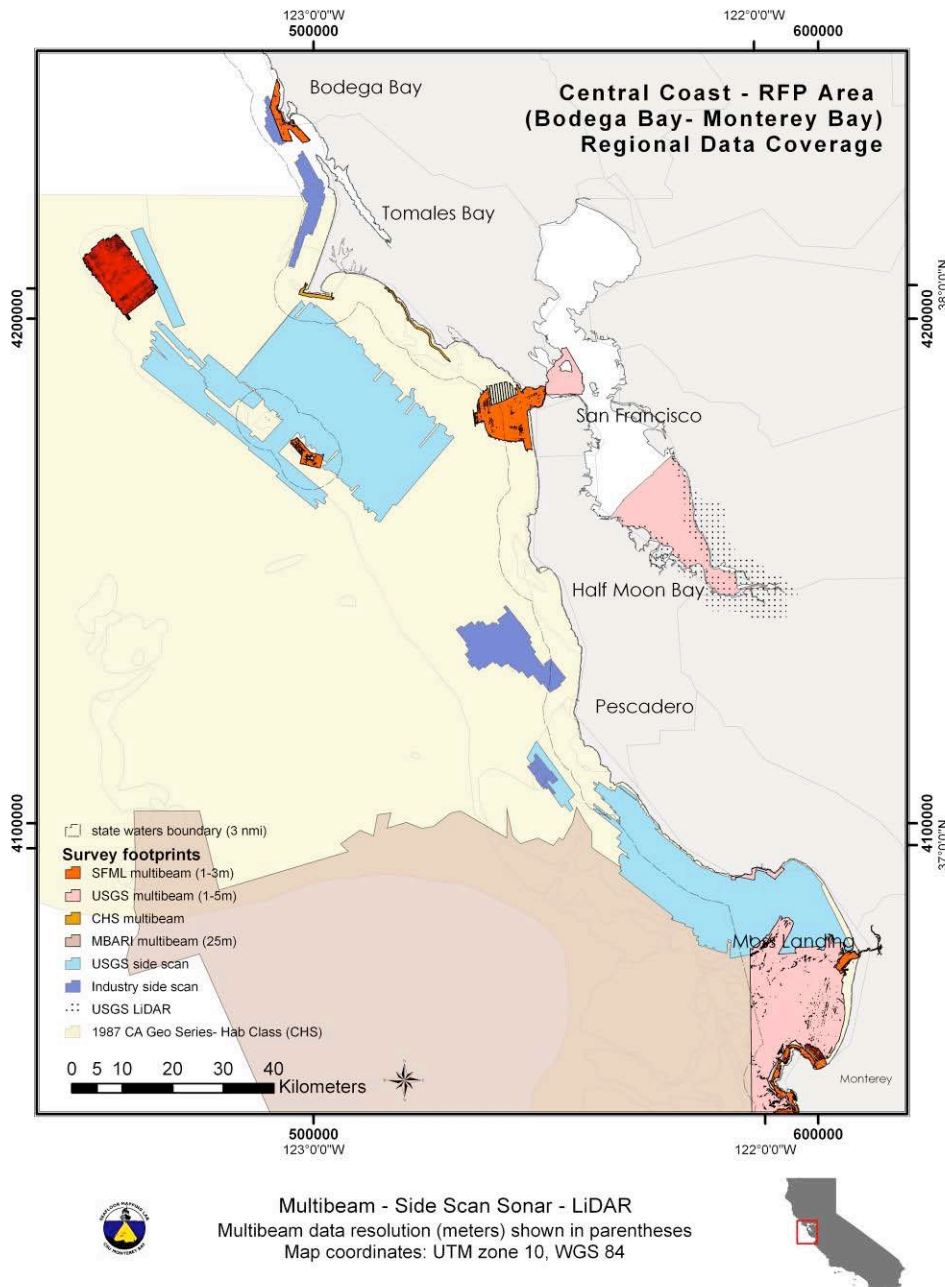


Figure 1. Workshop updated data holdings coverage map for the Central Coast RFP Project Area showing both multibeam (warm colors) and sidescan only (blues) sonar data sets. The dotted area shows LiDAR coverage. Maximum horizontal resolutions of the data sets are listed in the legend. The only additions to this area within state waters (3nm) are the relatively small contributions in the immediate vicinity of Point Reyes and along the Santa Cruz shoreline (N. Monterey Bay).

The priority weighting of desirable management information and areas of coverage for this RFP are based on the workshop recommendations (see Figure 2 and Table 1, below.)

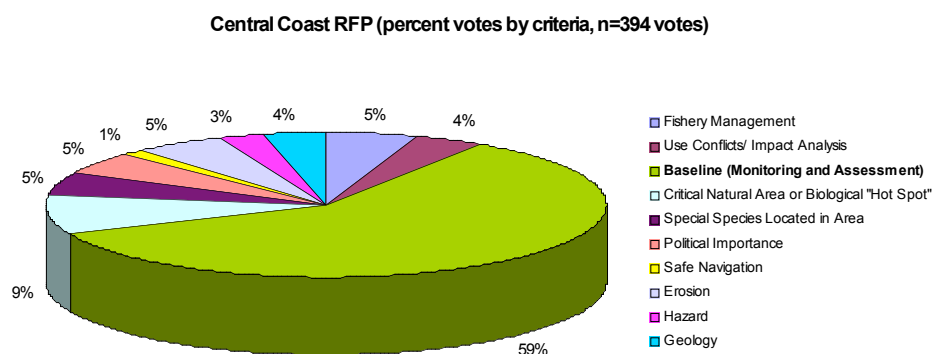


Figure 2. Distribution of RFP Area priority mapping votes by management/ information need criteria.

Table 1. RFP Area priority voting results: top 10 blocks identified in state waters (0-3 nm) for mapping based on Central Coast priority voting exercise.

Block #	General Location	Votes
464	N. of Half Moon Bay	55
446	N. of Golden Gate	35
478	Pt. Ano Nuevo	34
455	S. of Golden Gate	32
502	S. of Ano Nuevo	28
472	Half Moon Bay	27
458	Farallon Islands	23
422	Bodega Bay	20
438	N. Pt. Reyes	15
431	Dillon Beach	14

# Central Coast RFP Priority Blocks 2005

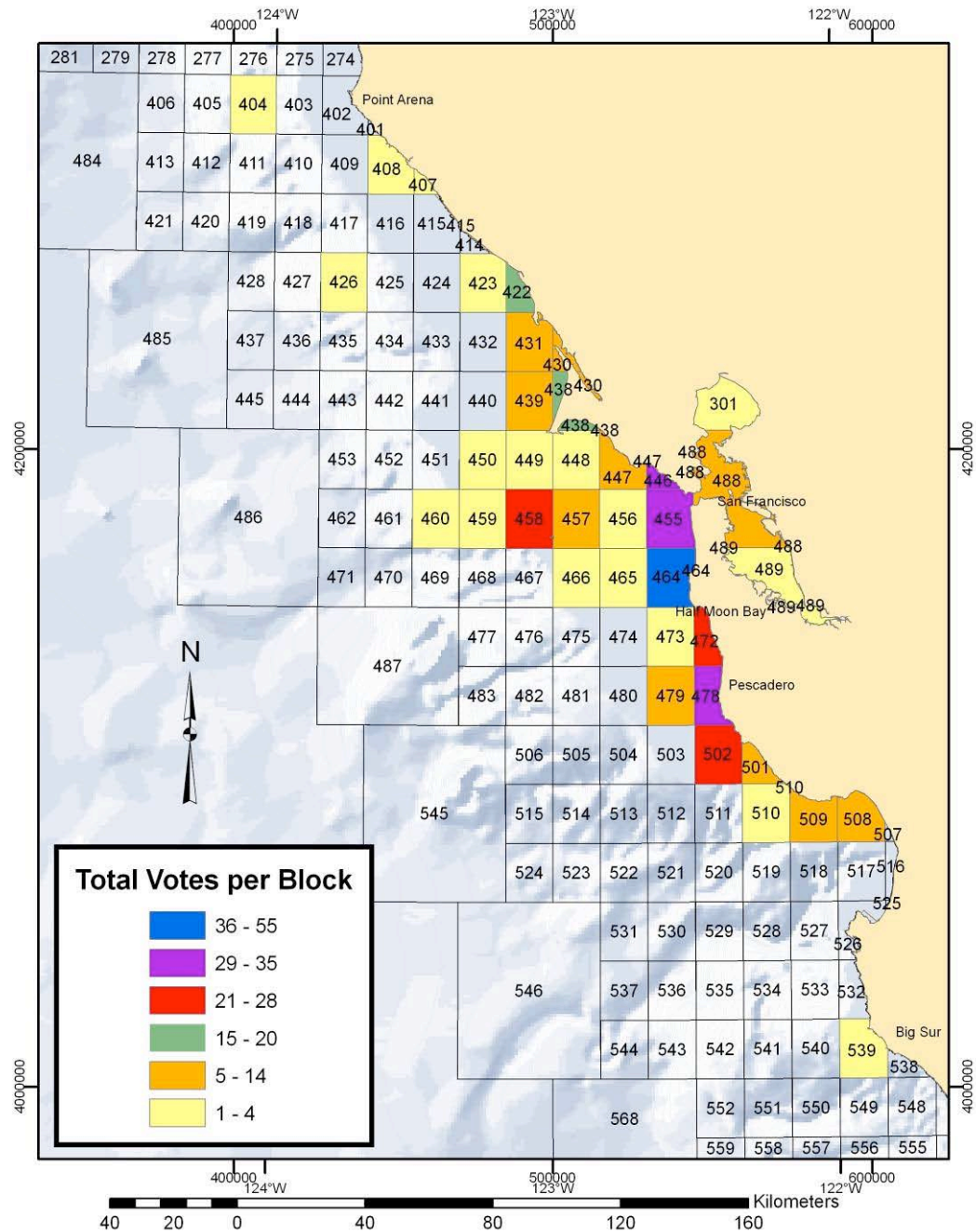


Figure 3. Spatial distribution of number of votes cast per block for the RFP Area (Monterey Bay to Bodega Bay) priority mapping needs.

## **Proposal Requirements**

MBSF, through the SIMoN program, is requesting proposals to survey and map the entire RFP area, from Monterey Bay to Bodega Bay and out to 3nm, shown in Figure 3. It is expected that this new effort will:

1. Produce high-resolution ( $\leq 5$  m) marine maps
2. Complement the existing data collected by other agencies
3. Conform to NOAA (<http://chartmaker.ncd.noaa.gov/hsd/specs/specs.htm>) and IHO order 1 mapping standards (<http://www.iho.shom.fr/publicat/free/files/S-44-eng.pdf>)
4. Ground-truth acoustic imagery using sediment grabs and/or video of the seafloor
5. Be compatible with web-based display and dissemination.

Proposals describing the intended research must be received at the SIMoN office by **5:00 P.M., June 2, 2006**. Each proposal must contain:

1. An Executive Summary (maximum of 3 pages)
2. A clear statement on the type of work to be performed (including acoustic equipment specifications, mapping methods, boating requirements, etc.)
3. A statement describing how the proposed work will be integrated with other ongoing efforts and how it will integrate historic data sets
4. An indication of how the work products will benefit resource managers and the State of California.
5. A list of products to be developed and timeline for completion
6. A description of the qualifications of all primary investigators and other staff to be utilized in the project
7. A detailed budget

Proposals may be up to 25 pages long, single spaced, 12 point font. Items 1 through 5 (above) shall be no longer than 15 pages.

MBSF and SIMoN recognizes that different strategies and approaches can be used to address the identified goals. Proposal reviewers will be open to any and all sound scientific approaches that will lead to successful completion of the tasks. Experienced professionals (or graduate students under the direction of a qualified researcher with experience in similar studies) are expected to lead the study. Cross-disciplinary collaborations among several research groups with varying expertise and linkages with other state and regional research and monitoring programs are strongly encouraged.

Evaluation factors include:

- Total area to be mapped
- Near shore areas to be mapped
- Tier 1 and Tier 2 derivative products, especially within the RFP area high priority blocks (page 6)
- Tier 3 derivative products
- Matching funding and in-kind contributions



Work products to be provided in a timely manner may include, but are not be limited to: descriptions of materials and methods; maps; data files; statistical summaries; literature reviews; periodic progress reports; and a comprehensive final report. This information will be integrated and disseminated through the SIMoN program and by the State Coastal Conservancy and the California Ocean Protection Council for a broader ecosystem understanding of National Marine Sanctuary and State waters. It is also expected that results from this work will be published in a peer-reviewed journal.

Sanctuary and Sanctuary Foundation staff will evaluate all proposals to determine if the objectives outlined in the RFP are met. Investigators whose proposals meet these criteria will be notified by June 16, 2006.

Proposals will then be sent out for a thorough and objective review to scientists who are experts in the particular fields represented in the proposal. External reviewers will be asked to score the proposed activities based on scientific merit, feasibility and broader impacts of the work. Sanctuary and Sanctuary Foundation staff and the SIMoN Science Committee will then evaluate the proposals and external reviews for their ability to provide the specific information needed for resource management decisions (e.g. baseline characterization, environmental monitoring, MPA siting, defining essential fish habitat) and a broader, long-term understanding of the area covered by the RFP. Authors of the successful proposal will be notified by July 21, 2006. Specific terms of the contract will be negotiated afterward.

Applicable state, local and federal laws and regulations must be followed. All permits, approvals and fees associated with conducting the work are the responsibility of the proposer.

### **Expected Level of Funding**

The Monterey Bay Sanctuary Foundation anticipates funding for this project of up to \$980,000 over a twelve to fifteen month period to complete the work and all of the derivative products. A maximum of fifteen-percent (15%) of project funds may be used for institutional overhead and fees.

The anticipated timeline for the project is as follows:

- Contract award, August 2006
- Data acquisition, September 2006 through February 2007
- Data Analysis and Interpretation, January 2007 through July 2007
- Project completion, Fall 2007

The State Coastal Conservancy and Monterey Bay Sanctuary Foundation reserve the right to require certain collaborations and specific products be developed within the budget available. In-kind and matching funds are strongly encouraged.

For more information go to: [www.mbnms-simon.org](http://www.mbnms-simon.org)



Submit proposals electronically as PDF or Word (preferred) files. Print copies are also acceptable. Questions and the proposal should be directed to:

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Sanctuary Integrated Monitoring Network (SIMoN)  
National Marine Sanctuary Program  
299 Foam Street  
Monterey, CA 93940  
Office: (831) 423-3475  
FAX: (831) 647-4244  
Email: [Steve.Lonhart@noaa.gov](mailto:Steve.Lonhart@noaa.gov)

Special Provisions of the State Coastal Conservancy and Monterey Bay Sanctuary Foundation, applicable to all proposers:

All material, data, information, and written, graphic or other work produced under this agreement is subject to the unqualified and unconditional right of the State Coastal Conservancy to use, reproduce, publish, display, and make derivative use of all such work, or any part of it, free of charge and in any manner and for any purpose; and to authorize others to do so. If any of the work is subject to copyright, trademark, service mark, or patent, the Conservancy is granted and shall have a perpetual, royalty-free, nonexclusive and irrevocable license to use, reproduce, publish, use in the creation of derivative works, and display and perform the work, or any part of it, and to grant to any third party a comparable and coextensive sublicense.

The work produced under this agreement may not be used for any profit-making venture.

This section shall not apply to any material, data, information, and written, graphic or other work held, produced or developed by the State Coastal Conservancy or by the grantee, or any of its contractors or subcontractors, independent of the project work under this agreement (“original work”). Any original work is and will remain the property of the party who originally held, produced or developed the material, data, information or written, graphic or other work. Notwithstanding the foregoing, this section shall apply to any material, data, information and written, graphic or other work which may be produced under this agreement that is based on or derived from any original work (“derivative works”) and the State Coastal Conservancy shall be assigned, granted or otherwise provided with the rights and interests in all derivative works as specified in this section.

Upon awarding of the contract, the proposer will be required to develop a comprehensive work program and submit that to the MBSF and State Coastal Conservancy for approval. Contract funding is subject to the practices and

policies of the State Coastal Conservancy. Reimbursements are handled through the Conservancy's "Request for Disbursement" process, described below.

The Monterey Bay Sanctuary Foundation shall disburse funds for costs incurred to date, less ten percent, upon the contractor's satisfactory progress under an approved work program, and upon the contractor's submission of a "Request for Disbursement" form, which shall be submitted no more frequently than monthly but no less frequently than quarterly.

As part of the funding agreement, the State Coastal Conservancy requires minimum insurance in the form and amounts as follows:

- General Liability, \$1,000,000 per occurrence
- Automobile Liability, \$1,000,000 per accident
- Marine Vessel and/or Aircraft Liability, \$1,000,000 per occurrence
- Workers' Compensation insurance as required by the Labor Code of the State of California

The Monterey Bay Sanctuary Foundation and State Coastal Conservancy shall be named as "additional insureds" on all policies.

## **Exhibit 1**

**Excerpted from the Statewide Marine Mapping Planning Workshop December 12 - 13, 2005**

### ***Interpretation and Habitat Classification***

All present acknowledged the ultimate need for and great value in full geologic and habitat interpretation of collected mapping data. However, it was also recognized that mapping is expensive and that the state of California currently has limited financial resources, leading to a debate about where to focus financial resources. The participants fell into three camps as to the minimum level of interpretation and classification that should be funded as part of a large regional mapping project supported with limited resources. The first camp favored reduced field data collection so as to fund maximum interpretation of all survey data collected. Their reasoning was that the data obtained from such a project would be of greatest value to the largest number of users if the results were fully and uniformly interpreted using consistent methods.

At the other end of the spectrum, the second camp recognized that if funds are limited, more interpretation means less area surveyed for a given level of funding. Their thinking was that scarce mapping funds should be allocated to maximize the acquisition of high quality, high resolution data, and the creation of those basic seafloor information layers that can be generated “automatically” and very efficiently using GIS analysis tools (e.g. gridded xyz bathymetry, DEM’s in shaded relief, contour lines, relief and slope analyses, backscatter/sidescan mosaics showing seafloor texture, etc.). Once the basic mapping data and information layers are processed, archived and made available, then the more detailed and labor intensive “manual” interpretation and attributing for specific geological or habitat needs at a specified scale could be conducted. Given the strong interest in and varied institutional needs for these levels of interpretation, the availability of the basic high quality survey data would induce many institutions to support the additional work needed for the full interpretation of these data.

Taking the middle ground, the third camp endorsed a balanced weighting of data collection and interpretation to maximize field data while simultaneously producing certain thematic maps with high-priority resource management information. Under this scenario, full interpretation recommended by the first camp would only be performed for those areas designated as “high” need sites by the sponsors, while the suite of basic derivative mapping products recommended by the second camp would be applied everywhere else.

Representatives from the US Geological Survey, who have made extensive use of seafloor mapping data to create highly interpreted and classified map products, made the following observations and recommendations. Their approach to costing out a project is to think of mapping product generation as a 3 tiered process of increasing project cost, with each tier being constructed from the previous. The first tier consists of the basic

survey data (xyz grids [bathymetry] and backscatter [substrate] mosaics. GIS technicians are able to efficiently convert these first tier data sets into second tier products at little additional cost using automated numerical derivatives including autoclassification of substrates and topographic index grids associated with various parameters (slope, aspect, rugosity, contours, relief, etc.). These second tier products are GIS-ready and are often of high value to management agencies because many of the patterns they are interested in (e.g. rocky versus soft bottom habitats, bed forms, and depth zones) are easily discernable at this intermediate level of data analysis. The third product tier requires careful “manual” work of highly experienced geologists to visually interpret the second tier products in terms of detailed and complex geologic and habitat classification schemes to produce attributed GIS polygon map products. USGS has found that this third level of product creation may increase project costs by approximately 50%.

As a result, there are very significant budget and/or survey coverage implications associated with the level of interpretation and map products specified as required in the scope of work for any given project. For example, based on the USGS experience described above, including full 3<sup>rd</sup> tier product creation in the scope of work could reduce the amount of funding available for data acquisition and thus the size of the overall survey area by as much as 50%. Given these significant implications, we present the following examples of products associated with each of the second and third tiers of map product creation listed above. Because balancing the level of data interpretation versus the size of the area that can be mapped will always be a challenge where resources are limiting, our expectation is that given the information needs of the sponsor these examples will help them identify when and where each of these levels of product creation are appropriate.

In the following sections we provide examples of second and third tier data products and in some cases their application to marine management issues. Our hope is that these examples will help the sponsors and planners of future surveys select and define the appropriate levels of mapping data analysis and interpretation for their particular project needs and applications.

### **Second Tier Map Products – Algorithmically Derived GIS Products**

Second tier map products include those that can be efficiently derived through automated or semi-automated GIS processes from the raw survey data products described above (e.g. bathymetric sounding values, backscatter intensity values). Two of the most common derivatives is gridded bathymetric data (DEMs) displayed in shaded relief. These grids not only clearly reveal the distribution of rock versus sediment to the observer, but they can be further classified with automated GIS tools to reveal and quantify the distribution of a variety of habitat parameters at user-specified scales. When combined in GIS with sidescan sonar backscatter mosaics that illustrate differences in surface texture, automated analyses of seafloor relief and bottom type can be used to create species-specific and scale independent habitat maps.

Additional derivative products relate to biotic mapping, habitat monitoring and change detection. Sidescan sonar backscatter has been effectively used to map the distribution and abundance of squid eggs and thus squid spawning grounds and reproductive output. Multibeam bathymetry data, especially in time series, can be used to quantify seasonal and interannual seafloor habitat and geomorphic change, and or monitor seafloor disturbance such as bottom trawling, and submarine landslides. Combining multibeam sonar with LIDAR DEM's has enabled precise quantification of nearshore and coastal habitat change and loss including tidal scour, sediment deposition and saltmarsh erosion.

### **Third Tier Map Products – Fully Interpreted Geologic and Habitat Classification Schemes**

Third tier map products involve the manual delineation and attributing of polygons based on the application of more or less complex geologic or habitat classification schemes to several second tier map product layers. Second tier products for depth, substrate type and geomorphology are typical requirements for applying these third tier schemes. The resulting products are information rich, and often esthetically pleasing. Despite the high information content, however, these third level products can be somewhat limiting because the manually traced polygon interpretation layer, once complete, is fixed both in scale and level of detail. I.e. zooming in beyond the scale at which the layer was created will reveal no additional information. If, for example, finer resolution of habitat patch size is required for a particular purpose, and the polygons were not created on that scale to begin with, it may be necessary to recreate the manually derived third tier polygon layer. Or, depending on the size of the area to be mapped, it may not be practical to recreate hand traced layers at very high levels of resolution. In cases where high, meter scale resolution is required over very large areas (10's of kilometers), more economical second tier automated analyses, which are scale-independent may have to be relied on or combined with courser third tier products. These considerations especially apply to situations where multiple high resolution species-specific habitat maps are required as products from a single survey data set.